Montana Fish, Wildlife & Parks

2013 Report on

Aquatic Invasive Species Monitoring

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The Montana Fish, Wildlife & Parks (FWP) Aquatic Invasive Species (AIS) Program works to implement the AIS Management Plan through coordination and collaboration, prevention of new AIS introductions, early detection and monitoring, control and eradication, and outreach and education. The goal of the AIS Management Plan is to minimize the harmful impacts of AIS through the prevention and management of AIS into, within and from Montana. The report for the Early Detection and Monitoring program for 2013 follows.

Early Detection and Monitoring – Background

Montana's Aquatic Invasive Species (AIS) early detection and monitoring program has been in place since 2004. Early detection allows Montana Fish, Wildlife & Parks (FWP) biologists to locate small or source AIS populations, while monitoring allows FWP to study current population trends. FWP monitors for all aquatic invasive species, including, but not limited to: zebra/quagga mussels (ZM/QM), New Zealand mudsnails (NZMS), and Eurasian watermilfoil (EWM). Plankton sampling for ZM, QM, and Asian clam veligers (microscopic larvae) has increased each year, in part due to an increase in volunteer sampling efforts. To aid in AIS monitoring, FWP employees – including fish health staff and regional biologists – have been given training in AIS species identification. FWP staff are often sampling high risk waters for other purposes, and additional AIS sampling increases overall efforts with less travel cost for AIS staff in Helena. Overall monitoring and early detection efforts have increased steadily over the years.

Methods

FWP assesses the risk for AIS introductions to waterbodies annually. Variables used in determining risk are constantly evolving. Sites are prioritized based upon the previous years' work conducted by FWP, available calcium and water quality data, angler/boater pressure, boater movement data from watercraft inspection stations, monitoring conducted by other state and federal agencies, surface-water hydrology of the system, and other assorted variables.

Montana utilizes a variety of techniques in monitoring for AIS species. Plankton sampling involves the collection of microscopic organisms in the water column using specialized, fine mesh nets and analyzing those samples at the FWP Dreissenid lab in Helena. Cross-polarized light microscopy is the method utilized by the lab to detect the larvae of invasive bivalves such as zebra mussels and Asian clams. Invertebrate sampling involves the use of kick nets and rock picking to search for invasive species while identifying native species and noting population densities. FWP has integrated MDA's plant specialist into its AIS program. All plant findings are included in this report. Polymerase Chain Reaction (PCR) testing or the amplification of environmental

deoxyribonucleic acid (eDNA) is used as a confirmation of microscopy findings for verification, if necessary. Fish pathogens, such as whirling disease, are considered AIS and therefore FWP conducts pathogen testing in fish in conjunction with other AIS monitoring. All of Montana's monitoring protocols have been scientifically reviewed, are updated annually, and are coordinated with neighboring states.

The movement of fish could also be a substantial vector for transferring AIS. FWP moves large numbers of fish through both its hatchery and wild fish transfer programs. Montana inspects all federal, state and commercial hatcheries annually as well as source waterbodies for any wild fish transfer. These AIS inspections include both on-site AIS surveys and disease/pathogen testing in fish. Hatcheries cannot receive certification to sell or move fish without passing an AIS inspection.

2012 Results

In 2013, a total of 138 waterbodies and 318 different sites were inspected in Montana. **The only <u>new</u> AIS populations in 2013 were found on Quake Lake (both Curly Leaf Pondweed and New Zealand Mudsnails) and Bluewater Creek (New Zealand Mudsnails)**. Both of these discoveries were not unexpected, due to their proximity to existing AIS populations. Table 1 on page 7 provides a complete listing of 2013 monitoring sites which includes AIS species observed as well as sites where no AIS were detected. Note that this table only shows the results for 2013 monitoring conducted by FWP, not previous years' results or results from surveys conducted by other agencies or organizations. Findings include the following:

- New Zealand mudsnails continue to persist at Darlington Ditch, Hauser Lake, Bighorn River, and the Missouri River.
- No adult populations of ZM/QM or Asian clams were detected this year or in previous years on Montana waters.
- No zebra/quagga mussel or Asian clam (*Dreissena spp*. or *Corbicula spp*., respectively) veligers were detected in the plankton samples processed by the FWP Dreissenid Lab in Helena in 2013 or in previous years for Montana waters.
- Eurasian watermilfoil continues to persist at Fort Peck Reservoir, Noxon Rapids Reservoir and Cabinet Gorge Reservoir.
- Curly leaf pondweed remains on the Bitterroot River, Canyon Ferry Reservoir, Hauser Lake, Hebgen Lake, Holter Lake, and Post Creek.

Figure 1 illustrates AIS monitoring sites over the past nine years, while Figure 2 illustrates sites monitored in 2013. All high risk sites are inspected annually at a minimum, while lower risk sites are surveyed less frequently. The program goal is to

comprehensively monitor the state every year, and all types of waterbodies (lakes, reservoirs, ponds, creeks, rivers, etc.) are included. This statewide emphasis is illustrated in Figures 1 and 2.

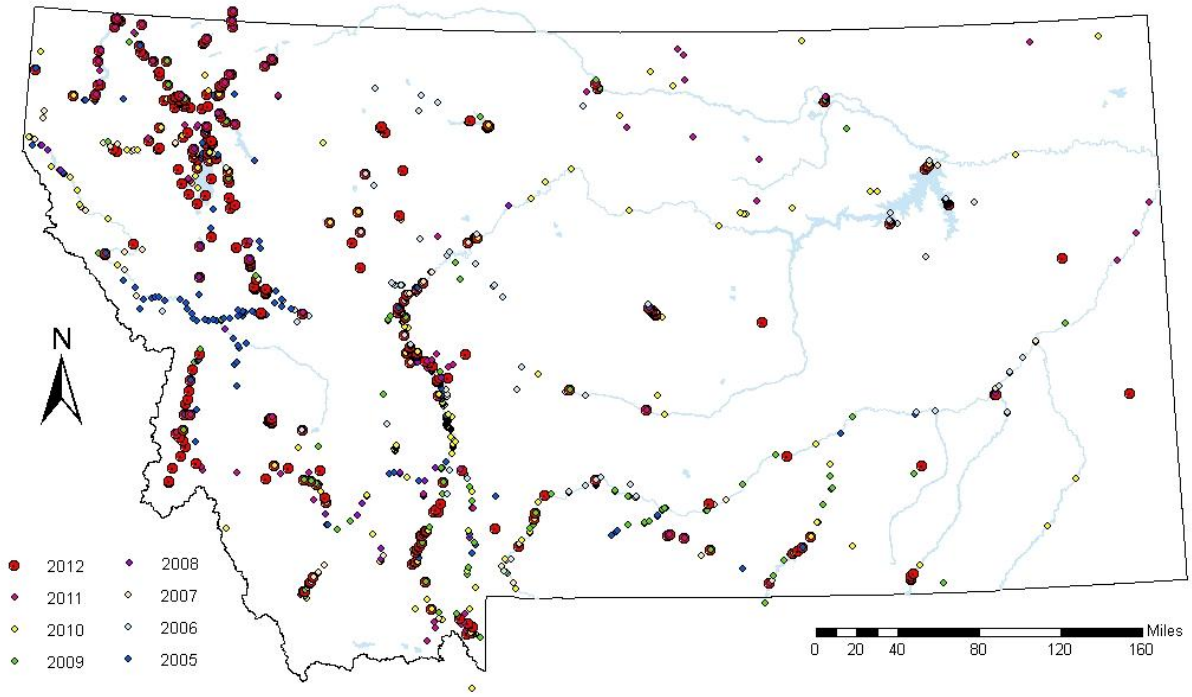

Figure 1: Map of AIS sampling locations, 2005-2012

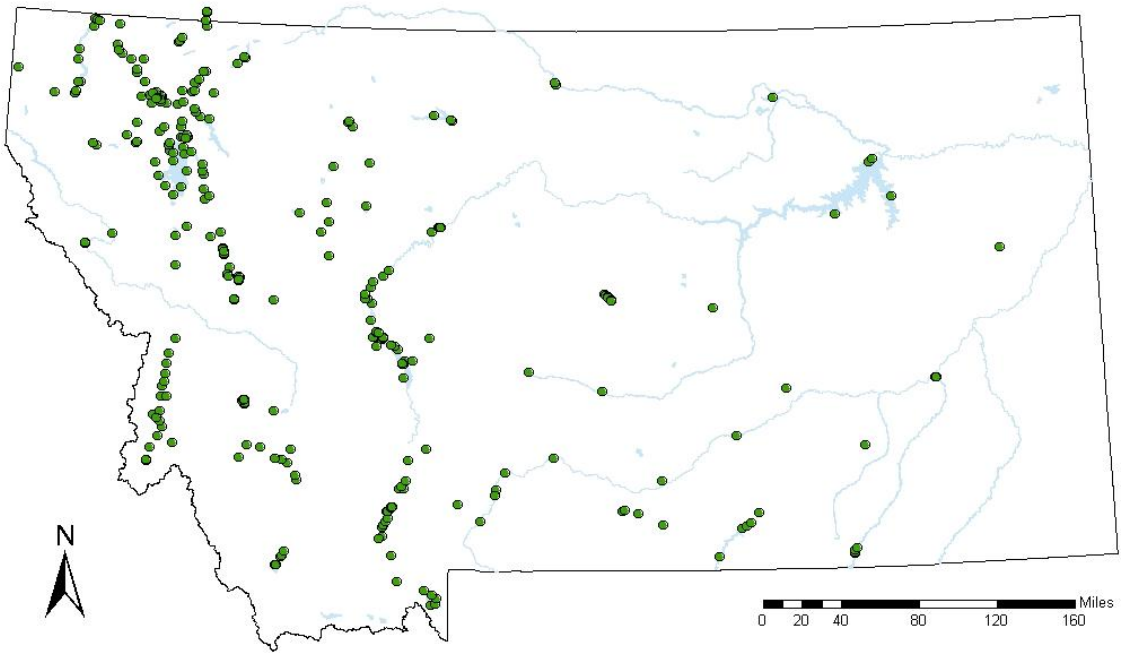

Figure 2: Map of AIS Sampling Locations, 2012

Figure 3 illustrates trends in AIS monitoring over the past nine years. Numerous variables contributed to the fluctuations in the data. The 2005 field season was hot and dry; therefore the sampling season was extended. Funding and staff was limited until 2009 when monitoring expanded. In 2010 and 2011, volunteer efforts were substantially increased by private organizations and other state and federal agencies concerned about the potential introduction of Dreissenid mussels. However, these years had short field seasons due to high water levels and cold water temperatures late into the summer. The 2012 and 2013 field seasons yielded more average flows and an increase in staff; however, monitoring was delayed due to the opening of multiple new watercraft inspection stations. Efforts were again augmented by volunteers and contractors.

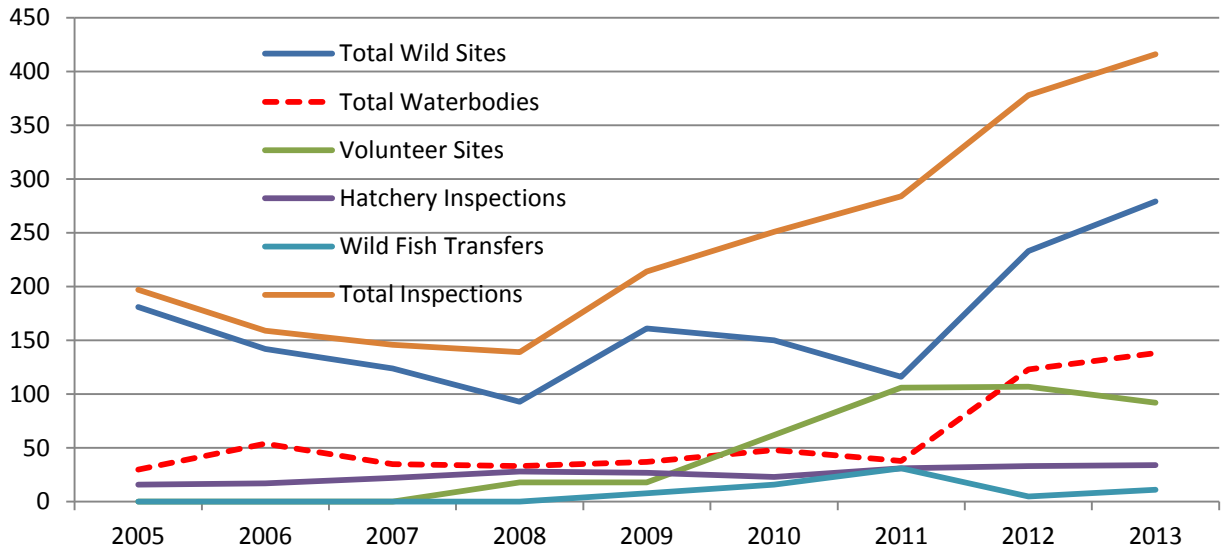

Figure 3: Annual AIS Monitoring (2005-2013)

Dreissenid Laboratory

The FWP Dreissenid lab is located in Helena, MT. It currently processes plankton samples for the Missouri River Basin, including Kansas, Nebraska, Missouri, North Dakota, South Dakota, Wyoming, and Montana. In 2013, it began processing samples for New Mexico and Colorado as well. It is in Montana's best interest to know what AIS may exist downstream, and as such, samples are processed for partner states as an in-kind service. Figures 4 and 5 illustrate the volume of samples handled by the lab each year. The base funding for this lab is provided by the U.S. Fish and Wildlife Service, and average turnaround time for samples is approximately two weeks. The lab has discovered new populations of *Dreissena spp.* veligers as well as *Corbicula sp.* (Asian clam) veligers for multiple downstream states. The lab undergoes routine quality control testing by other states and has participated in a community double-blind round robin study on the reliability of early detection methods (Frischer et al, 2011). **In 2013, no veligers for either genus were found in any Montana water samples processed by the FWP Dreissenid lab in Helena.** The out-of-state results for the lab in 2013 were as follows: *Corbicula sp*. veligers were detected in 25 samples from 3 states and 10 different waterbodies and *Dreissenid spp*. veligers were in 2 different waterbodies from one state.

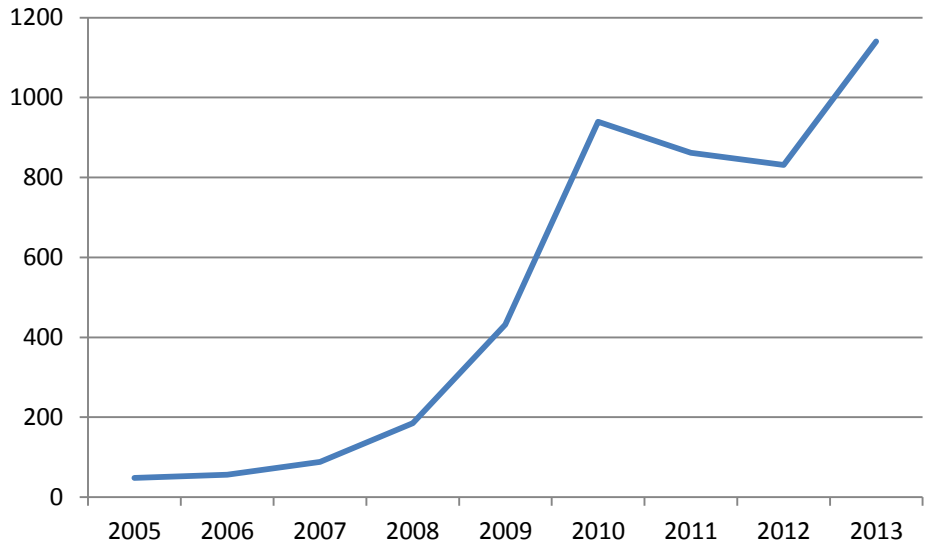

Figure 4: Number of samples processed by lab each year

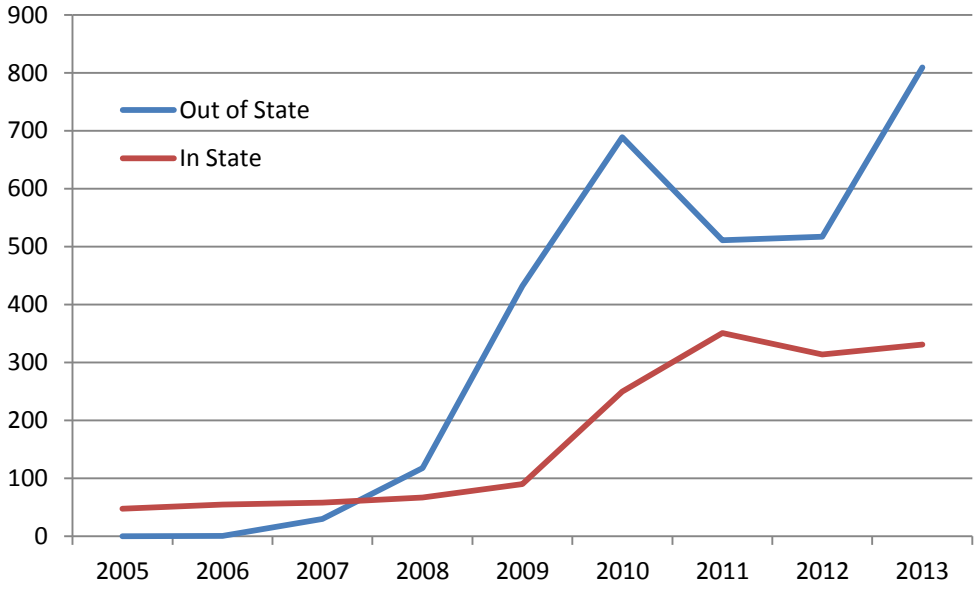

Figure 5: Number of plankton samples processed by lab per year: in state vs. out-of-state

Future Needs

Statewide monitoring efforts by FWP, private sector and government entities are continually improving and expanding. These efforts are critical to the early detection and monitoring of invasive species, and are an important aspect of the AIS program and statewide AIS Management Plan. While these efforts do not guarantee discovery of all AIS species as they are introduced, they do significantly increase the potential to

discover new populations before they become established. Limiting the establishment of AIS allows for research to be conducted into control and eradication methods, and allows for greater efficiency in monitoring and early detection methods. These advances will ultimately save the state time and money protecting its aquatic resources and infrastructure.

Table 1: 2012 AIS Monitoring Locations

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	AIS Occurrences
Afterbay Reservoir	1	Yes	Yes	Yes	Wild	
Ashley	2	No	No	Yes	Plankton Only	
Aspen Springs Trout Farm	1	Yes	Yes	Yes	Hatchery	
Bailey	2	No	No	Yes	Plankton Only	
Barge Water	1	No	No	Yes	Troubleshooting	
Beaver	2	No	No	Yes	Plankton Only	
Beaverhead River	4	Yes	Yes	Yes	Wild	
Big Hole River	6	Yes	Yes	Yes	Wild	
Big Sky	2	No	No	Yes	Plankton Only	
Big Spring Creek	4	Yes	Yes	Yes	Hatchery	
Big Springs Trout Hatchery	2	Yes	Yes	Yes	Hatchery	
Big Therriault	2	No	No	Yes	Plankton Only	
Bighorn Lake	3	Yes	Yes	Yes	Wild	
Bighorn River	9	Yes	Yes	Yes	Wild	NZMS
Bitterroot	2	Yes	Yes	Yes	Wild	
Bitterroot Fish Hatchery	1	Yes	Yes	Yes	Hatchery	
Blackfoot River	2	Yes	Yes	Yes	Wild	
Blaine	2	No	No	Yes	Plankton Only	
Blanchard	2	No	No	Yes	Plankton Only	
Bluewater Creek	10	Yes	Yes	Yes	Hatchery	NZMS
Bootjack	2	No	No	Yes	Plankton Only	
Bostwick Creek	1	Yes	Yes	Yes	WFT	
Bowman Lake	4	Yes	Yes	Yes	Wild	
Browns Lake	1	Yes	Yes	Yes	Wild	
Bull Lake	2	Yes	Yes	Yes	Wild	
Cabinet Gorge Reservoir	1	Yes	Yes	Yes	Wild	EWM
Canyon Ferry Reservoir	6	Yes	Yes	Yes	Wild	
Clark Canyon	2	Yes	Yes	Yes	Wild	

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	AIS Occurrences
Reservoir						
Clark Fork River	2	Yes	Yes	Yes	Wild	
Clearwater River	2	Yes	Yes	Yes	Wild	
Cooney Reservoir	2	Yes	Yes	Yes	Wild	
Creston National Fish Hatchery	1	Yes	Yes	Yes	Hatchery	
Crystal Lakes Hatchery	1	Yes	Yes	Yes	Hatchery	
Darlington Ditch	1	Yes	Yes	Yes	Wild	NZMS
Deadman's Basin Reservoir	1	Yes	Yes	Yes	Wild	
Dickey	2	No	No	Yes	Plankton Only	
Dollar	2	No	No	Yes	Plankton Only	
Echo Lake	3	Yes	Yes	Yes	Wild	
Ennis Lake	5	Yes	Yes	Yes	Wild	
Ennis Nat'l Fish Hatchery	1	Yes	Yes	Yes	Hatchery	
Fish	2	No	No	Yes	Plankton Only	
Five	2	No	No	Yes	Plankton Only	
Flathead Lake	16	Yes	Yes	Yes	Wild	
Flathead Lake Salmon Hatchery	1	Yes	Yes	Yes	Hatchery	
Flathead River	3	Yes	Yes	Yes	Wild	
Fort Peck Hatchery	13	Yes	Yes	Yes	Hatchery	
Foys	2	No	No	Yes	Plankton Only	
Fresno Reservoir	6	Yes	Yes	Yes	Wild	
Georgetown Lake	4	Yes	Yes	Yes	Wild	
Giant Springs Trout Hatchery	1	Yes	Yes	Yes	Hatchery	
Glen	2	No	No	Yes	Plankton Only	
Halfmoon	2	No	No	Yes	Plankton Only	
Hanson Doyle	2	No	No	Yes	Plankton Only	
Harriman Trout Co.	1	Yes	Yes	Yes	Hatchery	
Harrison Lake (Willow Creek Reservoir)	1	Yes	Yes	Yes	Wild	
Hauser Lake	12	Yes	Yes	Yes	Wild	NZMS, CLP
Hebgen Lake	5	Yes	Yes	Yes	Wild	
Helena Valley Reg. Res.	1	Yes	Yes	Yes	Wild	
Holland Lake	3	Yes	Yes	Yes	Wild	
Holter Lake	4	Yes	Yes	Yes	Wild	CLP

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	AIS Occurrences
Hungry Horse Reservoir	1	Yes	Yes	Yes	Wild	
Hyalite Creek	2	Yes	Yes	Yes	WFT	
Hyalite Reservoir	3	Yes	Yes	Yes	Wild	
Inez	3	No	No	Yes	Plankton Only	
Luloff Pond	1	Yes	Yes	Yes	Hatchery	
Jefferson River	1	Yes	Yes	Yes	Wild	
Jette	2	No	No	Yes	Wild	
Jocko River Trout Hatchery	1	Yes	Yes	Yes	Hatchery	
Beck Pond	1	Yes	Yes	Yes	Hatchery	
Kootenai River	2	Yes	Yes	Yes	Wild	
Kootenay Trout Hatchery, BC	2	Yes	Yes	Yes	Hatchery	
Lake Five	1	Yes	Yes	Yes	Wild	
Lake Frances	2	Yes	Yes	Yes	Wild	
Lake Helena	1	Yes	Yes	Yes	Wild	
Lake Koocanusa	36	Yes	Yes	Yes	Wild	
Lake Mary Ronan	3	Yes	Yes	Yes	Wild	
Lake McDonald	5	No	No	Yes	Plankton Only	
Lindbergh Lake	3	Yes	Yes	Yes	Wild	
Lost Loon	2	Yes	Yes	Yes	Wild	
Lower Stillwater Lake	4	Yes	Yes	Yes	Wild	
Lower Thompson Lake	1	Yes	Yes	Yes	Wild	
Madison River	15	Yes	Yes	Yes	Wild	
Maier Reservoir	1	Yes	Yes	Yes	WFT	
Marias River	2	Yes	Yes	Yes	Wild	
Martinsdale Reservoir	1	Yes	Yes	Yes	Wild	
McGilvray	2	No	No	Yes	Plankton Only	
McGregor Lake	2	Yes	Yes	Yes	Wild	
Middle Thompson Lake	1	Yes	Yes	Yes	Wild	
Miles City Fish Hatchery	1	Yes	Yes	Yes	Hatchery	
Milk River	1	Yes	Yes	Yes	Wild	
Missouri River	16	Yes	Yes	Yes	Wild	NZMS, CLP
Murphy	2	No	No	Yes	Plankton Only	
Murray	2	No	No	Yes	Plankton Only	
Murray Springs	1	Yes	Yes	Yes	Hatchery	

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	AIS Occurrences
Mussellshell River	1	Yes	Yes	Yes	Wild	
Nelson Reservoir	5	Yes	Yes	Yes	Wild	
Nelson's Spring Creek	3	Yes	Yes	Yes	Hatchery	NZMS off facility
Noxon Rapids Reservoir	2	Yes	Yes	Yes	Wild	EWM
O'Dell Creek	3	Yes	Yes	Yes	Wild	NZMS
Painted Rocks Reservoir	3	Yes	Yes	Yes	Wild	
Placid Lake	2	Yes	Yes	Yes	Wild	
Post Creek	1	Yes	Yes	Yes	Hatchery	CLP off facility
Quake Lake	1	Yes	Yes	Yes	WIld	NZMS, CLP
Rainbow Springs Trout Farm	1	Yes	Yes	Yes	Hatchery	
Rock Creek	1	Yes	Yes	Yes	Wild	
Rogers Lake	3	Yes	Yes	Yes	Wild	
Rose Creek	1	Yes	Yes	Yes	Hatchery	
Ruby Reservoir	1	Yes	Yes	Yes	Wild	
Ruby River	2	Yes	Yes	Yes	Wild	
Saint Mary Lake	4	No	No	Yes	Plankton Only	
Salmon Lake	6	Yes	Yes	Yes	WIld	
Seeley Lake	1	Yes	Yes	Yes	Wild	
Sekokini	1	Yes	Yes	Yes	Hatchery	
Skyles	2	No	No	Yes	Plankton Only	
Sophie	2	No	No	Yes	Plankton Only	
Spencer	2	No	No	Yes	Plankton Only	
Spring Meadow Lake	1	Yes	Yes	Yes	Wild	
St. Regis River	1	Yes	Yes	Yes	Wild	
Swan Lake	3	Yes	Yes	Yes	Wild	
Swan River	2	Yes	Yes	Yes	Wild	
Tally	2	No	No	Yes	Plankton Only	
Tetrault	2	No	No	Yes	Plankton Only	
Tiber Reservoir	14	Yes	Yes	Yes	Wild	CLP
Tongue River	2	Yes	Yes	Yes	Wild/WFT	
Tongue River Reservoir	3	Yes	Yes	Yes	Wild/WFT	
Twin Pond - Frenchtown	1	Yes	Yes	Yes	WFT	
Two Medicine Lake	3	No	No	Yes	Plankton Only	
Upper Stillwater Lake	3	Yes	Yes	Yes	Wild	

Waterbody	Site	Macrophyte Sampling	Invert Sampling	Plankton Sampling	Type	AIS Occurrences
Upper Thompson Lake	1	Yes	Yes	Yes	Wild	
Upper Twin Lake - Axoltl	1	Yes	Yes	Yes	WFT	
Van Lake	1	No	No	Yes	Wild	
Washoe Park Trout Hatchery	1	Yes	Yes	Yes	Hatchery	
Waterton Lake	6	No	No	Yes	Plankton Only	
Westslope Trout Co.	1	Yes	Yes	Yes	Hatchery	
Whitefish Lake	3	Yes	Yes	Yes	Wild	
Whitefish River	1	Yes	Yes	Yes	Wild	
Yaak River	1	Yes	Yes	Yes	Wild	
Yellowstone River	7	Yes	Yes	Yes	Wild	
Yellowstone River Trout Hatchery	1	Yes	Yes	Yes	Hatchery	

Literature Cited

Frischer, M.E., Nierzwicki-Bauer, S.A., Kelly, K.L. 2011. Reliability of Early Detection of *Dreissena* spp. Larvae by Cross Polarized Light Microscopy, Image Flow Cytometry, and Polymerase Chain Reaction Assays: Results of a Community Double-Blind Round Robin Study (Round Robin Study Phase II). http://www.musselmonitoring.com/Reports/RRII%20Final%20Report%20(2010).pdf.